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Grey Street, Gisborne – Streets For People

Post-Construction Stage Safe System Audit Report

Prepared for Gisborne District Council

REVISION 0 - OCTOBER 2024

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1 Safe System Auditing for Transport Projects

This report has been prepared for the Gisborne District Council to carry out a Post Construction Stage Safe System Audit for Grey Street, Gisborne, Streets for People project.

A Safe System audit is an independent review of a future transport project to identify any safety concerns that may affect the safety performance and alignment to a Safe System. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A Safe System audit is, therefore, a formal examination of a transport project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.), carried out by an independent competent team which identifies and documents Safe System alignment and road safety concerns.

A Safe System audit is intended to help deliver a safe road system and is not a review of compliance with standards.

1.1 Safe System Audit Procedure

The primary objective of a Safe System audit is to deliver a project that achieves an outcome consistent with the Safe System approach, that is, minimisation of death and serious injury. The Safe System audit is a safety review used to identify all areas of a project that are inconsistent with a safe system and bring those concerns to the attention of the client in order that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the safety audit team.

The key objective of a Safe System audit is summarised as follows:

To deliver completed projects that contribute towards a Safe System by identifying and ranking potential safety concerns for all road users and others affected by a transport project.

A Safe System audit should be undertaken at project milestones such as:

- Concept Stage (part of Business Case);
- Scheme or Preliminary Design Stage (part of Pre-Implementation);
- Detailed Design Stage (Pre-implementation / Implementation); and
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A Safe System audit is not intended as a technical or financial audit and does not substitute for a design check on standards or guidelines.

Any recommended treatment of an identified safety concern is intended to be indicative only and to focus the design team on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the "Waka Kotahi NZ Transport Agency Safe System Audit Guidelines," the audit report should be submitted to the client, who is to instruct the design team

to respond. The design team should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team's recommendation that is accepted, the client shall make the final decision and brief the design team to make the necessary changes and/or additions. As a result of this instruction, the design team shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid the decision.

Decision tracking is an important part of the Safe System audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations to be completed by the design team, safety engineer and client for each issue, documenting the design team's response, client decision and the action taken.

A copy of the report, including the design team's response to the client and the client's decision on each recommendation, shall be given to the Safe System audit team leader as part of the important feedback loop. The Safe System audit team leader is to disseminate this to team members.

1.2 The Safe System

A Safe System is a forgiving road system that takes into account human fallibility and vulnerability. Under a Safe System, the whole transport system is designed to protect people from exposure to high crash forces that lead to death and serious injury (DSI).

It is recognised that people are vulnerable, and the key crash types and associated crash forces that people can be exposed to lead to death or serious injuries. A Safe System manages crash forces within these limits to protect people.

The audit team is required to understand the human tolerance to force and identify where these boundary conditions are likely to be exceeded when reviewing the transport project.

1.3 Report Format

The potential road safety problems identified have been ranked as follows:

- The expected crash probability is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue.
- The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected impact speeds, type of collision, angle of collision and type of vehicle involved.

The key crash types and respective impact speed thresholds are shown below in Figure 1.3-1.

Key crash type		Impact speed threshold
Car/pedestrian/cyclist		20-30 km/h
Car/motorcyclist		20-30 km/h
Car/tree or pole (non-frangible objects)		30-40 km/h
Car/car (side-impact, intersections)		50 km/h
Car/car (head-on, rear-end)		70 km/h

Figure 1.3-1 - Key crash types and impact speed thresholds

Reference to historic crash rates or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, frequency and likely severity that may result from a particular concern.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Safety concern risk rating matrix below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

		Severity outcome				
		Non-injury	Minor		Serious	Fatal
		Property damage only (PDO)	Injury which is not 'serious' but requires first aid, or which causes discomfort or pain to the person injured.	Safe System injury threshold	Injury (fracture, concussion, severe cuts or other injury) requiring medical treatment or removal to and retention in hospital.	A death occurring as the result of injuries sustained in a road crash within 30 days of the crash.
Probability of a crash	Very likely	Minor	Moderate		Serious	Serious
	Likely	Minor	Moderate		Serious	Serious
	Unlikely	Minor	Minor		Significant	Serious
	Very unlikely	Minor	Minor		Significant	Significant

Figure 1.3-2 - Safety Concern Risk Rating Matrix

1.4 Disclaimer

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environs, and the opinions of the SSA team. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe, and no warranty is implied that all safety issues have been identified in this report. Safe system audits do not constitute a design review nor an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the report's accuracy, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

2 Safe System Audit Details

2.1 Type of Audit

This Post-Construction Stage Safe System Audit (SSA) report for the Grey Street, Gisborne – Streets For People project has been prepared for the Gisborne District Council.

A key driver of the SSA is the identification of hazards or deficiencies that can potentially result in serious and fatal crashes.

2.2 The Safety Audit Team

The safe system audit was carried out in accordance with the Waka Kotahi NZ Transport Agency Safe System Audit Guidelines, Road to Zero Edition – August 2022 by:

- Matheus Boaretto, Urban Connection Limited, Hawke's Bay – Team leader
- Steve James, Urban Connection Limited, Wellington – Team member

2.3 Meetings and Site Inspections

The Safety Audit Team (SAT) undertook a full site inspection during the daytime and nighttime on 30 July 2024.

3 Project Description

3.1 Project Background and Objective

The Streets for People project seeks to primarily enhance cyclist safety on Grey Street in Gisborne by implementing protected cycling facilities. Safety improvements for pedestrians are also included through additional pedestrian crossings. Associated traffic calming measures on Grey Street and at vehicle accesses, along with the associated road markings and traffic signs, are also introduced. The extent of the works is from Grey Street/Childers Road intersection to 130 m west of Grey Street/Kahutia Street intersection, as shown in Figure 3.1-1.

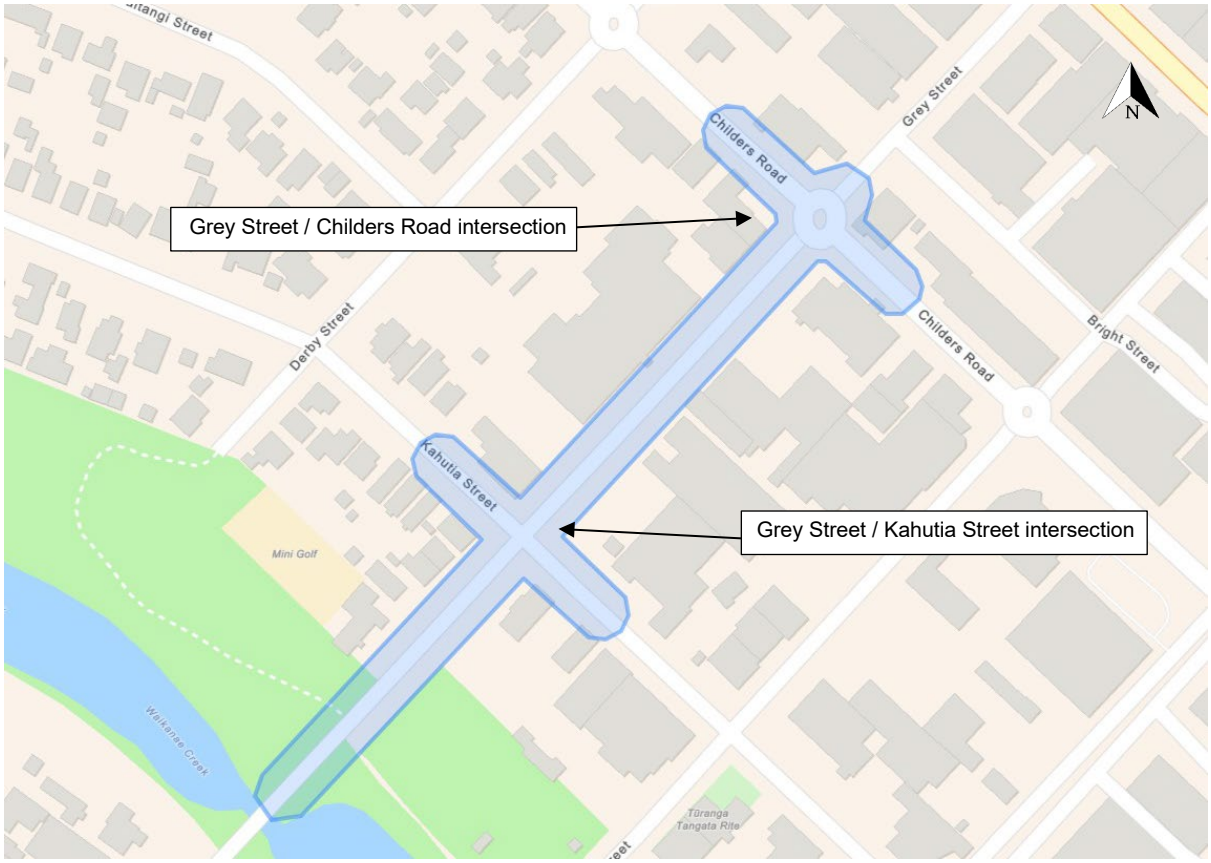

Figure 3.1-1 Locality plan

3.2 Existing Conditions and Context

The existing conditions and context of the sections subject to this assessment are as follows:

- Grey Street has a recorded annual average daily traffic (AADT) from 2,899 to 6,000 (Mobile Road 2022), with 3% of heavy vehicles;
- Grey Street provides the connection between Waikanae to the south and Gisborne CBD to the north. Typical road users consist of residents of Gisborne travelling to and from the CBD. The adjoining roads are Arterial, Primary Collectors, or Secondary Collectors;
- The posted speed limit is 50 km/h throughout the site;

- The section throughout the site is urban commercial. The alignment is flat and straight on both ends of the site;
- A high presence of pedestrians and cyclists is expected due to the link to the CBD, the adjacent commercial area and stake and bike parks and tracks;
- A high presence of children is likely, especially on weekends, given that a Stake (and scooter) park is located on the east side of Grey Street and the pump track is located west of the site; and
- The typical cross-section throughout Grey Street is two-lane two-way, with wide sealed shoulders.

3.3 Proposed Works

The project consists of the following improvements.

- Pedestrian and cycling improvements on Grey Street, specifically:
    - Installing a new protected bi-directional cycleway (typically 3 m wide) with a 0.7 m wide buffer and 0.6 m wide concrete separators between the cycle lane and parking along Grey Street;
    - Installation of new courtesy crossings on Grey Street East and Kahutia Street South;
    - Installation of a modal filter at Kahutia Street South, which bans the right turn movements at the Grey Street/Kahutia Street intersection;
    - Introducing a new public space and a pick-up/drop-off area near the skate park along Grey Street;
    - Installation of a new flush pedestrian crossing at mid-block on Grey Street between Kahutia Street and Childers Road using concrete traffic islands, rubber speed humps, and markings;
    - Installation of a new raised pedestrian crossing across Childers Road to the south of the Grey Street/Childers Road intersection; and
    - Road markings and signs.

The SSA team has been provided with the following documents for this audit:

- Streets for People – Gisborne Grey Street Linear Park Trial: Detailed Design Set – For Construction – Version 2.1 – Project number: NZ3334 – Dated 29 April 2023

4 Safety Concerns

4.1 Crash History

The crash history of the site was assessed to assist the SSA team in understanding the safety performance of the site and its immediate surroundings. A 5-year CAS assessment was undertaken from 2019 through 2023, including 2024 to date. The crash location map is shown in Figure 4.1-1, and the summary of the crashes is presented in Table 4-1.

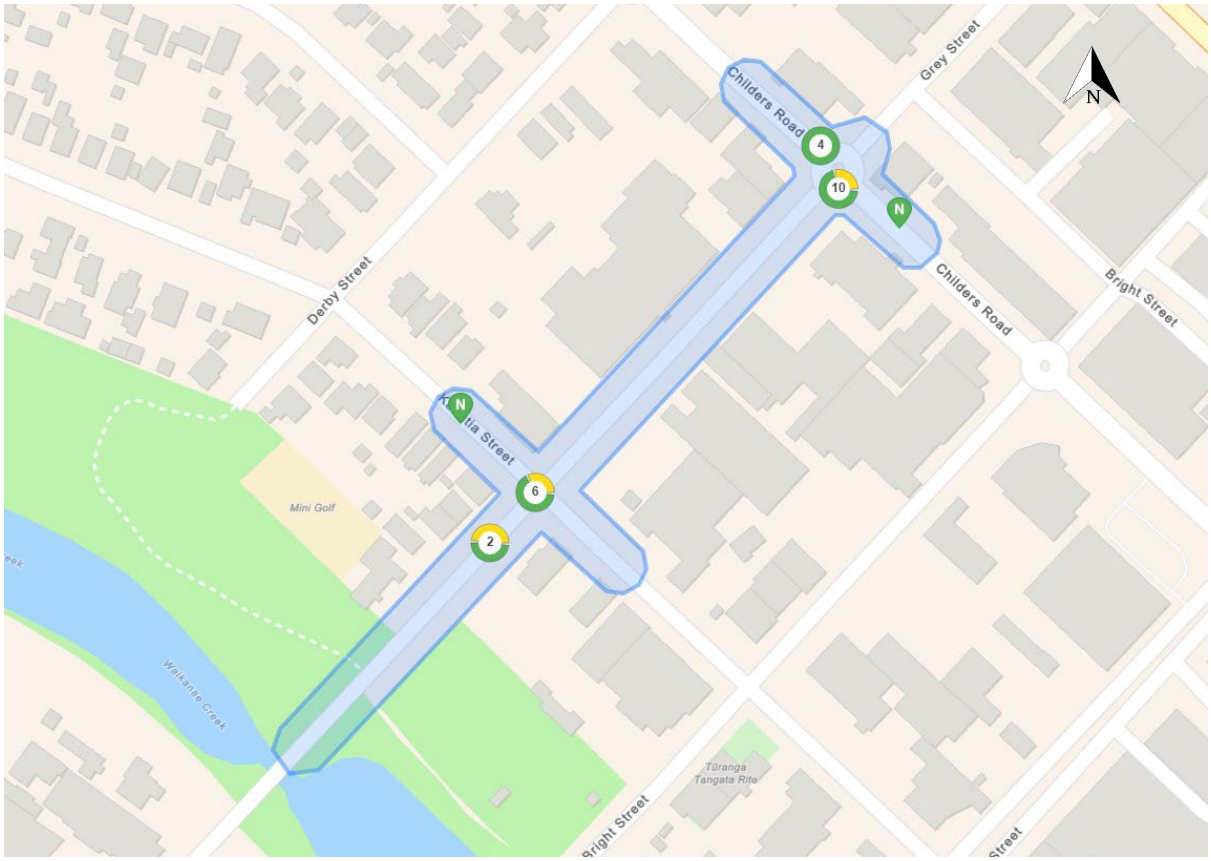

Figure 4.1-1 – Extent of safety assessment and crash locations

Table 4-1: Crash Summary 2018 – 2024 (to date)

Crash Severity	Grey Street (0.530 to 0.880)	
	Frequency	Casualties
Fatal	0	0
Serious	0	0
Minor Injury	6	7
Non-injury	18	-
Total	**24**	**7**

Crash Type		Environment		
Overtaking crashes	0%	Natural light conditions	Light/overcast	70.83% (17)
Straight road lost control/head-on	4.17% (1)		Dark/twilight	29.17% (7)
Bend lost control/head-on	4.17% (1)	Road conditions	Dry	89% (24)
Rear end/obstruction	29.17% (7)		Wet	11% (3)
Crossing/turning	62.5% (15)		Ice or Snow	0%
Others	0%	**Intersection/midblock**		
Involved motorcyclists	4.17% (1)	Intersection		83.3% (20)
Involved pedestrians/cyclists	12.5% (3)	Midblock		16.7% (4)

There have been a total of 24 crashes, including six minor-injury crashes and 18 non-injury crashes, along this section of Grey Street in the last 5 years. None of the crashes were serious injuries or fatal crashes. 83.3% of crashes occurred at intersections. The most common type of crash was crossing or turning at intersections, followed by rear-end crashes.

4.2 Summary of findings

The safety concerns from the Concept Design Stage RSA are presented in Table 4-2 below. This summarises the previously identified risks and actions taken in the Detailed Design Stage.

Table 4-2: Concerns from the Concept Design Stage

Safety Concerns	Action
Section 5.3.1 – Tree Planters – Visibility obstruction.	Issue addressed – Low planter boxes were installed. The client's decision states that contractors were to be engaged to maintain the planter boxes for the duration of the trial.
Section 5.3.2 – Cycleway Crossfall and Vehicle Crossing – Steep crossfall, catch pits and vehicle accessways	Issue resolved – The client decided not to level crossfall due to funding, and monitoring will be undertaken.
Section 5.3.3 – Courtesy Crossing – Inconsistent treatment	Issue resolved – The client decided to install a zebra pedestrian crossing on Kahutia Street (E). Monitoring is to be undertaken.
Section 5.3.4 – Existing Raised Pedestrian Crossing – issues related to crossing ramps, line markings and accessibility.	Issue resolved – Client Decision states that this pedestrian crossing is outside of the scope of the project, but feedback has been given to the appropriate team.

Section 5.3.5 – Crossings at the Grey Street/Kahutia Street Intersection – Speed management and layout	Issue addressed – Speed management was installed in the form of speed humps, and a dual crossing has been installed.
Section 5.3.6 – Tactile Pavers – Consider providing TGI's where missing and on all crossing points	**Issue not addressed** – Tactiles were missing at the time of the audit, being not in line with current standards/guidelines. The client instructed the designer to provide tactiles. This is further discussed in Section 4.4.4.
Section 5.3.7 – Vegetation over the cycleways –low-hanging branches.	Issue addressed – tree branches were trimmed.
Section 5.3.8 – Cycleway Connection to Existing Crossing	Issue resolved – Client decided that this was outside the project's scope.
Section 5.3.9 – Northern Tie-in – Cycleway and Courtesy Crossing Conflict	Issue resolved – The design was to progress according to the designer's recommendation and as per the client's decision.
Section 5.3.10 – Pedestrian refuge – missing or substandard refuges	Issue resolved – Client decided to review changes if there is a permanent stage. The project area is to be monitored with s-tech traffic cameras.
Section 5.3.11 – Proposed Parking Spaces – parking dimensions	Issue resolved – Client's decision states that parking is to be as per design and will be monitored and evaluated.
Section 5.3.12 – Tripping hazards on footpath	Issue resolved – Client states that budget for footpath renewals was not finalised at the time of the report, and the issue is to be monitored with s-tech traffic cameras.
Section 5.3.13 – Plate on the Drain – tripping hazard	Issue resolved – Client states that budget for footpath renewals was not finalised at the time of the report, and the issue is to be monitored.
Section 5.3.14 – Visibility restriction – Childers Road Crossing –	Issue addressed – The sign was moved, and existing trees are under a maintenance schedule.
Section 5.3.15 – Cars Encroaching Footpath	**Issue not addressed** – The client's decision states that separators have been installed to prevent the issue from occurring. The auditors could not identify any change.
Section 5.3.16 – Speed management measures (speed humps) – Consider providing RSPs at all crossing points	Issue resolved – Client decided that speed is managed through vertical deflection devices (speed humps), and monitoring and evaluation will be continued throughout the trial.
Section 5.3.17 – Connectivity to Side Road	Issue resolved – Changes to be investigated if there is a permanent stage of the project. The project area is to be monitored with s-tech traffic cameras.

4.3 Summary of findings

The frequency of risk rankings associated with this Safe System Audit is provided below, with detailed findings to follow. This summary illustrates the degree of consideration that should be given when working through the findings.

Table 4-3: Summary of Findings

Serious	Significant	Moderate	Minor	Comment	Total
1	4	-	8	4	17

4.4 General Safety Concerns

4.4.1 Missing Kerb Separators (Physical Deterrent) — Serious

Whilst on-site, the audit team noted a few unusual and unsafe driving behaviours, as follows:

- A car turned left out of the AA centre, drove along the cycle lane, around the tree and turned left into Kahutia Street (E). This movement is shown in orange colour in Figure 4.4-1;
- A car turned left out of Kahutia Street (W) onto Grey Street, performed a U-turn after the central kerbed island, drove through the cycleway and artwork pavement markings and turned into Kahutia Street (E). This movement is shown in red colour in Figure 4.4-1;
- A delivery vehicle drove through the cycleway and parked over the artwork pavement markings on the southern side of the Grey Street/Kahutia Street intersection.

The auditors note that no concrete kerb separators are provided in the vicinity of the Grey Street/Kahutia Street intersection. Therefore, no physical deterrent is present to prevent vehicles from cutting across the cycleway.

The likelihood is assessed as likely, given that three events were witnessed during the site visit (within 60 to 90 minutes). Physical speed management measures (i.e., speed humps) have been installed by the project, which results in low operating speeds throughout the section. Due to the low speeds, a minor injury crash would typically be expected to occur in the event of a crash. However, a high presence of children is likely throughout the site, especially on weekends, given that the stake/scooter park is located on the east side of Grey Street and the pump track west of the site. If the crash involved a child (or elderly), a serious injury could potentially result.

Table 4-4: Risk analysis – Against a pedestrian

Prominent crash type		▪ Vehicle versus pedestrian
Probability	Likely	▪ Low frequency of motorists driving across the cycleway
Severity	Serious	▪ Impact speeds generally expected to be below 30 km/h; however, serious outcome could be generated if a child is involved.

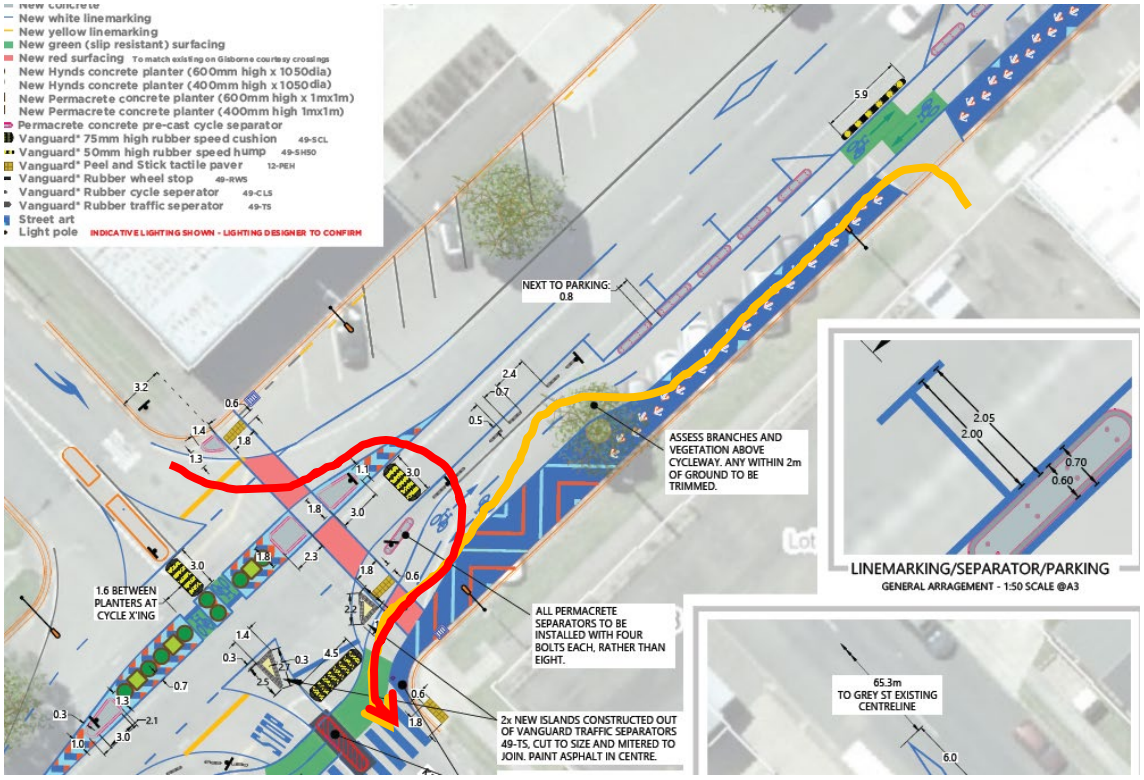

Figure 4.4-1 – Unsafe movements diagram

Figure 4.4-2 – Car driving across the cycleway and turning left onto Kahutia Street

Figure 4.4-3 – Car driving across the cycleway and turning left onto Kahutia Street (2)

Figure 4.4-4 – Delivery and service vehicle parked on artwork pavement markings

Figure 4.4-5 – Section with no physical deterrent (concrete kerb separators) on the north side of the Grey Street/Kahutia Street intersection

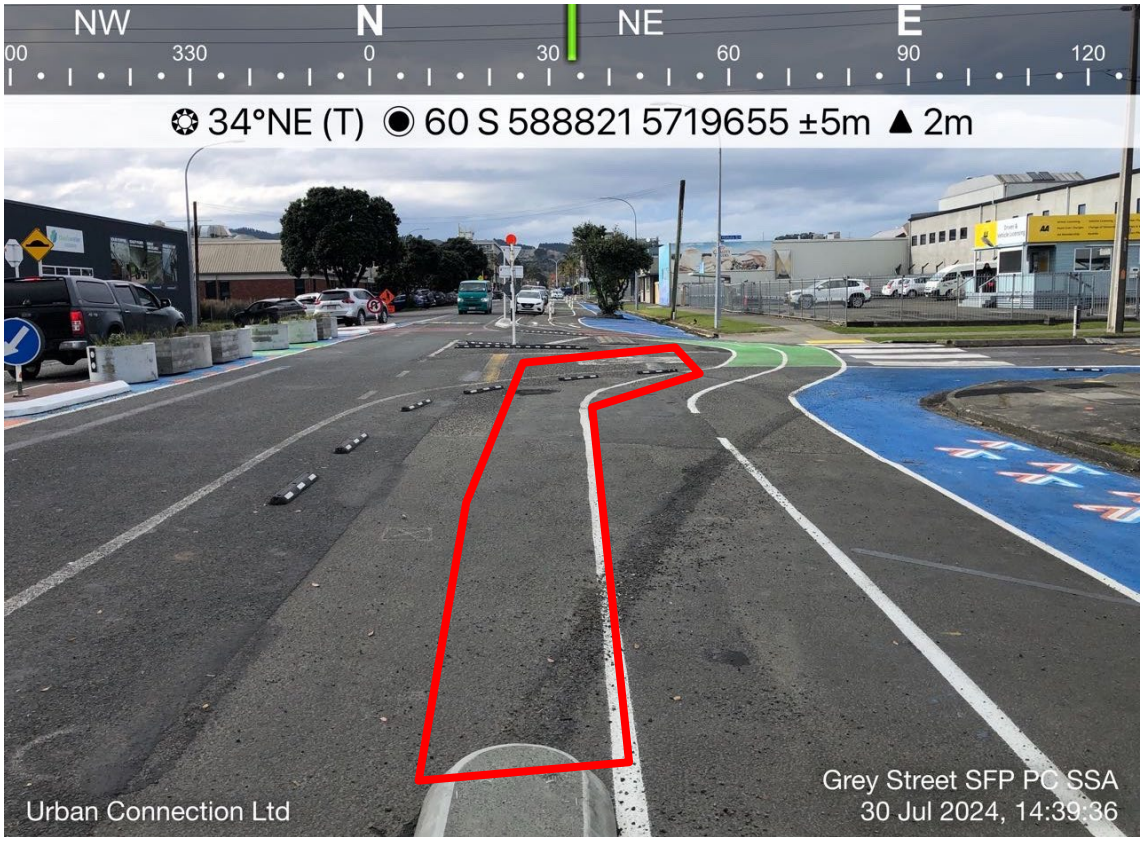

Figure 4.4-6 – Section with no physical deterrent (concrete kerb separators) on the south side of the Grey Street/Kahutia Street intersection

Recommendation:

1. *Consider installing physical deterrent measures to prevent manoeuvres across the cycleway, including near accessways (such as the AA centre).*

Probability Rating: ***The probability of a crash is* Likely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Serious**
Design Team Response: *The design included a bollard between the cycling and pedestrian spaces on each side of Kahuita Street to try and prevent these sorts of movements. I understand this was not installed due to late changes which enabled some elements to be mountable by trucks. Earlier versions of the design included concrete seperators on Grey Street east of the intersection, which were subsequently cost-cut to the very minimal rubber seperators in the space there now, which clearly don't prevent vehicles crossing. Our suggestion – replace the rubber seperators east of Kahutia on Grey Street with more substantial, preferably concrete.*	
Safety Engineer: *Agree. The environment should be managed with infrastructure provided to: protect vulnerable road users and / or prevent unintended vehicle manoeuvres which may compromise safety.*	
Client Decision: *During the construction, the intersection was rescoped following truck movement trials as it was found trucks needed to have mountable corners for the left hand turn. The bollards were then removed and replaced with low seperators. Flexi posts can be installed after the seperators to prevent vehicles accessing this area on the other side of the existing seperators. These are low cost and do not interfere with truck movements. We are waiting to see the Corridor Analysis report to under the frequency and risk profile of this action.*	
Action Taken: *Recommended installing flexi posts and to be reviewed once the corridor analysis report is received.*	

4.4.2 Left-turns onto Kahutia Street (W) **Significant**

The design provides vehicle tracking for a large rigid truck (11.5 m long), indicating that the movements undertaken by these vehicles are appropriately accommodated at the Grey Street/Kahutia Street intersection. However, the auditors observed evidence (wheel tracks) that heavy vehicles were going over the kerb and encroaching on the berm/footpath when undertaking a left turn onto Kahutia Street (W), as shown in Figure 4.4-7.

The auditors cannot determine if this was a single occurrence of a manoeuvring mistake or if there is a turning demand for longer heavy vehicles. It is noted, however, that the area appears constrained to accommodate turning movements of longer heavy vehicles (for instance, semi-trailers).

This condition can result in safety issues involving pedestrians waiting to cross the road and turning heavy vehicles. Due to the low turning speeds and likely low frequency of heavy vehicle movements, the probability of a conflict is assessed as very unlikely. However, a collision between pedestrians and heavy vehicles could be serious, even at low-impact speeds.

Table 4-5: Risk analysis – Against a pedestrian

Prominent crash type		▪ Heavy vehicle versus pedestrian
Probability	Very Unlikely	▪ Low turning speeds ▪ Low frequency of longer HCVs
Severity	Serious	▪ Impact speeds generally expected to be below 30 km/h; however, serious outcome could be generated in the event of a heavy vehicle v. pedestrian

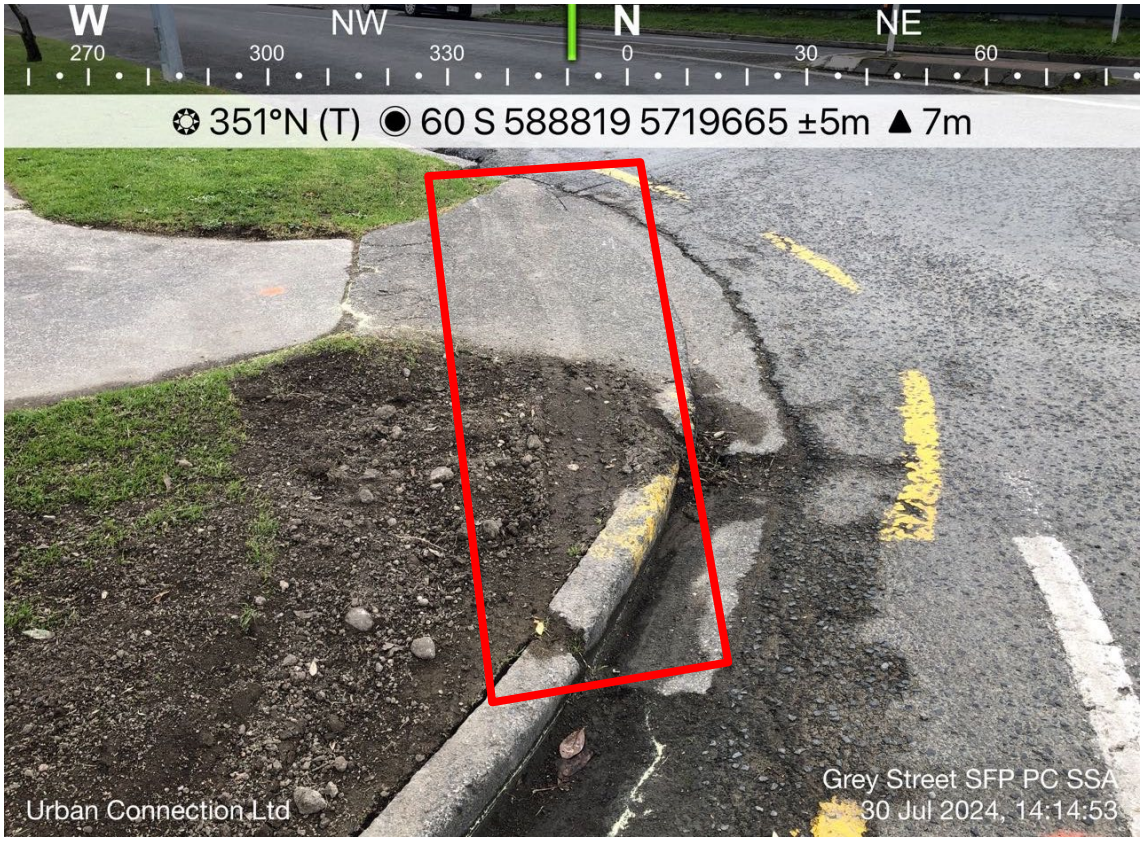

Figure 4.4-7 – Wheel tracks on the berm and footpath

Recommendation:

1. *Confirm if there is a turning demand for longer heavy vehicles at this intersection;*
2. *Undertake vehicle tracking for longer heavy vehicles; and*
3. *Consider layout changes to accommodate the turning of longer heavy vehicles or physical measures to protect pedestrians on the footpath.*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **Very Unlikely**	***Crashes are likely to be*** **Serious**

Design Team Response: *As can be seen in Google Streetview imagery, most that dated July 2019, this is a pre-existing issue, however, potentially the over-run may have become more frequent since the modal filter was installed.This project was designed to accommodate the RTS18 Large Rigid Truck as the design vehicle, however it has become evident that larger vehicles make movements into and out of Kahutia Street semi-regularly. We recommend investigation into what demand there is for larger vehicles, which movements, and whether there are alternative reasonable routes some of these particuarly large vehicles can take which do not pass through this key urban area. For remaining movements, we suggest adjustments to the design to accommodate the RTS18 Semi Truck, such as localised changes to kerblines and/or removal/adjustment of some islands. with careful consideration and mitigation of effects on safety and amenity for all other users.*

Safety Engineer: *Agree. Heavy vehicle movements should be deterred or safely provision made for their manoeuvring.*

Client Decision: *This has been identified as a pre-existing issue prior to the changes made on Grey Street. The placement of the pre-exisitng traffic island and the placement of the Pohutukawa Tree made it a tight left hand turn into Kahutia Street for large trucks.*

Action Taken: *Maintenance have enquired into widening and strengthening the pram crossing as this was a preexisiting issue and this will be completed through the footpath maintenance budget.*

4.4.3 Signage **Significant**

Some of the signage installed throughout the section has been assessed as confusing for approaching traffic. In some instances, up to four signs have provided on sign poles. This is assessed as a signage overload for drivers, who are unlikely to be able to comprehend all actions required from the signs within the time/space available. This is detailed below.

- Grey Street/Kahutia Street intersection:
    - Northeastern approach: four signs are provided on a single pole, including an orange disk sign, a give-way sign, a supplementary 'to cyclists & pedestrians' sign and a pedestrian crossing sign. Note that the orange disc A hump sign is provided approximately 10 m before (refer to Figure 4.4-8);
    - Southeastern approach: three signs are provided on a single pole, including a give-way sign, a supplementary 'to cyclists & pedestrians' sign and a pedestrian crossing sign (refer to Figure 4.4-9). No orange disc and black & white pole is provided at the pedestrian crossing;
    - Southeastern and northwestern approaches: two signs are provided on a single pole adjacent to the limit line, including a stop sign and a no-right-turn sign (refer to Figure 4.4-9);

Figure 4.4-8 – Signage at the northeastern approach of the Grey Street/Kahutia Street intersection

Figure 4.4-9 – Signage at the northeastern approach of the Grey Street/Kahutia Street intersection

- Grey Street/Childers Road intersection:
    - Southeastern approach (westbound direction): three signs are provided on a single pole, including a give-way sign, a supplementary 'to cyclists & pedestrians' sign and a pedestrian crossing sign (refer to Figure 4.4-10);
    - Southeastern approach (westbound direction): two signs are provided on a single black & white pole, including an orange disk and a hump sign (refer to Figure 4.4-11);

- Southeastern approach (eastbound direction): four signs are provided on a single black & white pole, including an orange disk sign, a give-way sign, a supplementary 'to cyclists & pedestrians' sign and a pedestrian crossing sign (refer to Figure 4.4-12);

Figure 4.4-10 – Signage at the southeastern approach of the Grey Street/Childers Road intersection (westbound direction)

Figure 4.4-11 – Signage at the southeastern approach of the Grey Street/Childers Road intersection (westbound direction)

Figure 4.4-12 – Signage at the southeastern approach of the Grey Street/Childers Road intersection (eastbound direction)

- Zebra Crossing on Grey Street:

  - Both approaches: two signs are provided on a single pole, including a pedestrian crossing sign and a hump sign (refer to Figure 4.4-13 and Figure 4.4-14);

Figure 4.4-13 – Signage at the zebra crossing on Grey Street (northbound direction)

Figure 4.4-14 – Signage at the zebra crossing on Grey Street (southbound direction)

As described above, this is a signage overload where too much information is provided, making it difficult for approaching drivers to comprehend and react to the regulation and/or warning. This condition increases the likelihood of conflicts between vehicles, pedestrians and cyclists.

Particular regard is also required concerning the signage at the northeastern approach of the Grey Street/Kahutia Street intersection (as shown in Figure 4.4-8). At this location, a give-way sign is provided along the priority route (Grey Street), confusing motorists as to which road has priority at the intersection; as is, vehicles could be misled that traffic along Kahutia Street has priority, which is not the case. This can lead to rear-end and side-impact crashes. Furthermore, the orange disc and give-way sign may mislead motorists in relation to the courtesy crossing on Grey Street, which does not establish priority for pedestrians.

The signage throughout the site also does not comply with the rules of the Traffic Control Devices (TCD) 2004[1] and/or MOTSAM, as follows:

- A traffic sign must not be installed with another sign on the same pole except if the additional sign is a supplementary sign and some other exceptions not applicable to this situation;
- No other traffic sign other than an orange disk shall be erected on a black and white pole at a pedestrian crossing;
- A pedestrian crossing sign should be erected in advance of the conflict area by at least a distance associated with the operating speed limit (for instance, for a 50 km/h operating speed, the sign should be at least 65 m from the crossing);
- A hump sign should be erected in situations where there is a sharp rise in the profile of the road that is likely to cause considerable discomfort to car passengers, cause shifting a load or a loss of control crash. This may not be applicable to all humps throughout the site;

[1] Land Transport Rule – Traffic Control Devices 2004 – Rule 54002/2004 – Section 4.5

The auditors recognise that it may be difficult to accommodate traffic signs at some locations throughout this section. On the other hand, the signage strategy is considered confusing, which could lead to safety issues. The prominent issue relates to conflicts between vehicles and vulnerable road users (pedestrians and cyclists). Due to the low speeds, lighting and typically good visibility, the probability is assessed as unlikely. Generally, conflicts would be expected to result in minor injuries due to the low impact speeds; however, if the crash involved a child or elderly, serious injuries could be generated.

Table 4-6: Risk analysis – Against a pedestrian

Prominent crash type		▪ Vehicle versus pedestrian
Probability	Unlikely	▪ Low speeds; ▪ Lighting; ▪ Good intervisibility.
Severity	Serious	▪ Impact speeds generally expected to be below 30 km/h; however, serious outcome could be generated if an child/elderly is involved.

Recommendation:

1. *Consider installing the signage as per TCD rules.*
2. *At the northeastern approach of the Grey Street/Kahutia Street intersection, consider a combination of the RP63 and RP65 signs (shown below).*

Probability Rating:	***Severity Outcome Rating:***
***The probability of a crash is* Unlikely**	***Crashes are likely to be* Serious**

Design Team Response: Through the design process, there was significant discussion regarding compromises to TCD rules regarding signage combinations, because of conflicts due to the TCD rules being optimised for less complex circumstances than have recently become common around New Zealand, including on this project; notably, the combination of intersections, priority crossings for both walking and cycling, and traffic calming, all in close succession. The design team worked to minimise signage, as well as consider precedents set by other projects around the country.

Below is an explanation for some sign combinations highlighted by the SSA, and recognition of potential changes to signage:

General notes:

(1) W16-2 (zebra crossing) signs:

TCD mandates these signs, however not including them for priority pedestrian and cycle crossings was considered, given they are advised with 'Give Way' 'To pedestrians and cyclists' signage. However, It was suggested that we include W16-2 signs for all approaches given they are

universally included on all other local priority crossings

(2) 'Give Way' with supplementary 'to pedestrians and cyclists' signage on approaches to priority crossings is a TDC requirement for cycles having right of way across a road-way.

(3) Removal of all hump signs, on the basis of reducing over-saturation of signage, will be discussed between GDC and the design team.

Locations Highlighted by the SSA:

Figure 4.4-8: Northeastern approach of the Grey Street/Kahutia Street intersection

The signage closest to the intersection from this approach was originally spread across two islands; one each before and after the courtesy crossing over Grey Street. However, a late design change was implemented to cater for larger trucks, which required the latter island to be fully mountable, and as such the signage was combined onto one pole. There is no location beyond the current pole where signage could be placed prior to the crossing.

Further to this, moving any of the signs currently on the striped pole further east would make it less clear that they apply only to the left movement..We suggest that this could be mitigated by a combination of:
-Replace the Give way + supplementary with a RP63 +RP65, sharing a new pole further to the North east.
-Move the W16-2 sign to a new, separate pole, also North East on Grey St, and roughly 65m in advance of the intersection, and add a supplementary 'ON LEFT' sign.

Figure 4.4-9: Southeastern approach of the Grey Street/Kahutia Street intersection
We will investigate opportunities to move the W16-2 (zebra crossing) sign further south-east along Kahutia Street, at a position roughly 65m in advance of the crossing, such that the Give way + supplementary no longer shares a pole.

Stop and No right turn sign location changes from design were subject to late changes to accommodate larger trucks. We will investigate opportunities to move the no right turn sign off the Stop pole, moving it onto the new light pole on the left (next to the crossing), or onto a new pole in that vicinity.

Figure 4.4-10 & 11 Southeastern approach of the Grey Street/Childers Road intersection (westbound direction)
The Give Way + supplementary was combined with the zebra crossing sign at this location given the local context: other positions in advance of this position, but within the vicinity of the crossing, were deemed less visible, as they would be on the far side of on-street parking, and/or obscured by street trees.

The hump and belisha signs could be separated by moving the belisha to instead be on the adjacent new light pole.

Figure 4.4-12 southeastern approach of the Grey Street/Childers Road intersection (eastbound direction)

Its agreed that this is a large number of signs to share a pole, which could lead to signs being missed by drivers, plus the striped pole being barely noticeable.

However, the suggested solution of a combination of RP63 and RP65 doesn't account for traffic moving straight across Childers, or turning right out of Grey (Northeast bound) towards the crossing. Further, the combination does not make clear whether it applies to left or right turning traffic, or both.

Aside from the current location of these signs, there is no identified location where any of the existing signs could go where it would be clear what movements and location they apply to.

If requested, an option could be to replace the zebra sign with three zerba signs, one on each approach to the roundabout, leaving only the combination of the Belisha and Give Way + supplemental sharing the pole. Its recognised that TCD does not allow for this combination, however there is precedent for shared striped poles around the country where conditions are constrained.

A further measure to be considered to improve the legibility of zebra crossing associated signage here is the addition of a second belisha and striped pole on this approach, on the centre island

Safety Engineer: *Agree. The signs need to be installed to meet legal requirements, be simple / concise, and effective.*

Client Decision: *To review the signage as specified above*

Action Taken: *Signage is currently being reviewed and any signage being removed will be repurposed elsewhere.*

4.4.4 Guidance to the Visually Impaired **Significant**

The guidance for the visually impaired throughout the crossing points along the site is poor. This condition increases the chances of conflicts between these vulnerable road users and vehicles. The following has been observed at the time of the site visit:

- No directional (leading) tactile indicators are present to lead the vision impaired to the crossing points. These users have no guidance as to where to cross the road;
- Missing or poorly installed warning (hazard) tactile indicators at several locations throughout the section, including:
    - Warning tactiles too close to the traffic lanes or cycleway;
    - No warning tactiles on the pedestrian refuge at the northeastern side of the Grey Street/Kahutia Street intersection;
    - No warning tactiles through Kahutia Street (W) and courtesy crossing adjacent to the Childers Road intersection;

Figure 4.4-15 – Directional tactiles do not cover the entire footpath

Figure 4.4-16 – No directional tactiles (Kahutia Street (E))

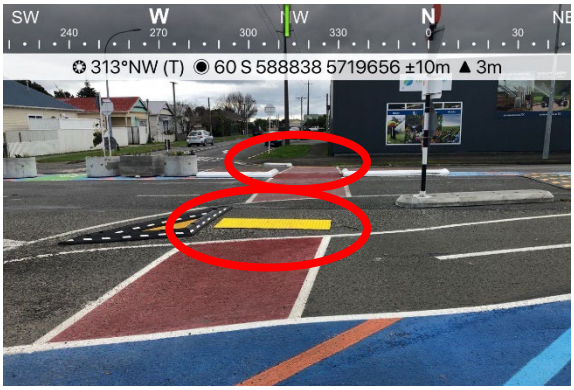

Figure 4.4-17 – Warning tactiles too close to the cycleway and no warning on the refuge

Figure 4.4-18 – No directional tactile indicators and poor installation of warning tactiles at the pedestrian crossing on Grey Street

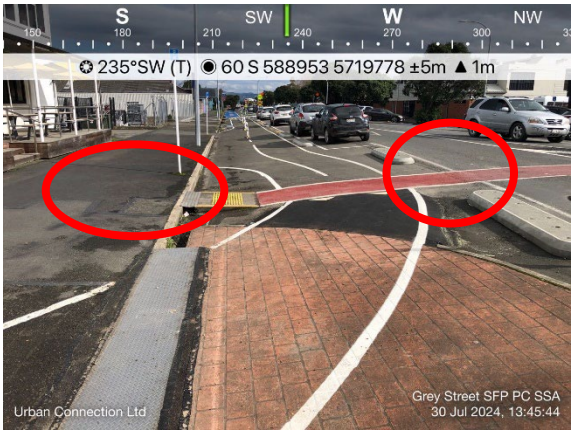

Figure 4.4-19 – No warning tactiles past the cycleway and no directional tactiles

Figure 4.4-20 – No directional tactile indicators at the pedestrian crossing on Childers Road

Figure 4.4-21 – No directional tactile indicators at the pedestrian crossing on Childers Road

Figure 4.4-22 – No warning and directional tactiles at the pedestrian crossing on Grey Street

The above deficiencies could result in conflicts between vehicles/cyclists and visually impaired users. The probability of conflicts between vehicles and visually impaired people as a result of the deficiencies is assessed as very unlikely, given the low vehicle speeds and number of visually impaired. Generally, conflicts would be expected to result in minor injuries due to the low impact speeds; however, if the crash involved a child or elderly, serious injuries could be generated.

Table 4-7: Risk analysis – Vehicle versus pedestrian/cyclist

Prominent crash type		▪ Vehicle versus pedestrian
Probability	Very Unlikely	▪ Low speeds; ▪ Low number of visually impaired.
Severity	Serious	▪ Impact speeds generally expected to be below 30 km/h; however, serious outcome could be generated if an elderly is involved.

Recommendation:

1. *Install TGSIs in accordance with current standards/guidelines.*

Probability Rating: ***The probability of a crash is* Very Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Serious**

Design Team Response:

The prioritisation of tactile infrastructure for this trial project was developed in collaboration with a disability specialist. The specialist recommended that directional tactiles would be excessive for a project of this nature, however any permanent project resulting from this trail is recommended to include directional tactiles.

The quick failure of adhesive for the tactiles installed in some locations is recognised as an issue, which is currently being investigated.

Some specific responses for situations raised but not covered above:
Fig 4.4.15:
Changes to the existing raised table crossing are considered generally outside of the scope of this project, however the design team recommends that GDC consider this remediation as part of any future project relevant to the crossing.

4.4.16:
The tactiles at this location were originally designed to be in the tactical footpath space, however a late design change was made to allow for large trucks to occasionally track over this area , rendering it inappropriate as a safe waiting space. Creating an adjacent row of tactiles in the tactical space a safe distance back from the tracking will be investigated

4.4.17:
We have received advice from a disability specialist that tactiles should ideally be placed outside of the carriageway/cycleway, but not generally between a cycleway and carriageway, as this can create an overload and lead to confusion. As such, we recommend moving these tactiles back to the outside of the cycleway, so that the arrangement is similar to that in 4.4.19

Safety Engineer: *Agree. Consistent and effective guidance should be installed for visually impaired users. I recommend consultation with a representative organisation such as Blind Low Vision NZ and / or the Orientation & Mobility instructors.*

Client Decision: *Tactiles are to be replaced and installed as per the guideline.*

Action Taken: *To reinstall temporary tactiles. The new tactiles to be installed on a better surface within the walkway for better durability.*

4.4.5 Electronic Billboard Distraction **Significant**

A large electronic billboard is installed on the southeastern corner of the Grey Street/Childers Road intersection. This electronic billboard emits rapid-moving, bright, colourful and interchangeable messages that can potentially distract motorists approaching the intersection, particularly the ones approaching from the southeast and northwest.

Note that the billboard is located in close proximity to the recently constructed raised pedestrian and cycle crossing. In this area, it is important that motorists are focused on the interaction with the vulnerable road users using the crossing and that distractions are minimised. The distraction caused by the billboard may increase the likelihood of a driver not stopping/giving way for the vulnerable road users, potentially leading to a crash. It may also lead to rear-end and side-impact crashes at the intersection.

Note that electronic billboards/signs are required to comply with the TCD rules. Some information has been collected from Part 3 (Advertising signs) of the TCD. Animated or flashing signs should not be used as roadside advertising if:

- They incorporate a revolving light of any colour;
- They rotate as a whole about any axis other than a vertical one;
- The message is more complex than a single word, logo or symbol displayed in any direction at one time;

In addition, each installation or proposed installation needs to be reviewed to ensure that possible distractive effects are minimised, being carefully assessed where:

- They are located close to an intersection, merging or diverging traffic sites or other sites where demands on motorists' concentration is high;
- Each separate display is not static from the first appearance to replacement;
- The time to change from one display to the next is greater than two seconds;
- The minimum time for any separate display is less than five seconds.

The pedestrian crossing and intersection are expected to accommodate moderate to high volumes of pedestrians, cyclists and vehicles. However, due to the low turning speeds as a result of the roundabout layout, the probability of crashes is assessed as unlikely. Generally, conflicts would be expected to result in minor injuries due to the low impact speeds; however, if the crash involved a child or elderly, serious injuries could be generated.

Table 4-8: Risk analysis – Against pedestrians

Prominent crash type		▪ Vehicle against pedestrians
Probability	Unlikely	▪ Low speeds due to roundabout;
Severity	Serious	▪ Impact speeds generally expected to be below 30 km/h; however, serious outcome could be generated if a child/elderly is involved.

Figure 4.4-23 – Electronic Billboard/Sign

Recommendation:

1. *Consider relocating the electronic sign away from the zebra crossing or provide an electronic billboard in accordance with TCD rules.*

Probability Rating: ***The probability of a crash is* Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Serious**
Design Team Response: *This issue is outside of the scope of this project, and it is recommended for consideration by GDC*	
Safety Engineer: *Agree. Distractions to drivers should be avoided at key decision points where there is the risk of serious injury; especially vulnerable road users such as pedestrians and cyclists.*	
Client Decision: *This was an existing crossing point with the objstruction in place without being under the control of a zebra crossing*	
Action Taken: *No action taken*	

4.4.6 Cycle Lane Pinch Points **Minor**

The two-way cycle lane has pinchpoints where the width is narrower than desired, which could lead to conflicts between cyclists. One of these pinch points, in front of the stake park, is only 1.8 m wide – the tolerable minimum width should be 2.5 m[2]. Due to low cyclist speeds, low to moderate cycle volumes and good forward visibility, the probability of a crash has been assessed as very unlikely. The pinch points are also highlighted with red surfacing and 'slow' pavement symbols, further mitigating the risk. Any conflict would be expected to be minor in nature.

It is acknowledged that existing trees may create impediments to a wider cycle lane configuration at those points.

Table 4-9: Risk analysis – Against vulnerable road users

Prominent crash type		▪ Between vulnerable road users (cyclist v cyclist)
Probability	Very Unlikely	▪ Low cyclist speed; ▪ Low-moderate cycle volumes; ▪ Good forward visibility;
Severity	Minor	▪ Low impact speeds of less than 30 km/h

Figure 4.4-24 – Pinch points in front of the skate park

[2] NZTA Separated Cycleways guidance (hyperlink provided)

Recommendation:

1. *Consider widening the cycle lanes to ensure a consistent minimum tolerable width of 2.5m along the site.*

Probability Rating: ***The probability of a crash is* Very Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Minor**
Design Team Response: *Significant consideration was given to this issue at design phase, leading to the installed warning markings. Splitting the directions of the cycleway, such that the tree is in the middle, was also considered, but given the good sightlines and low volumes, it was determined users would generally follow the shortest, rather than the left route around the tree, negating any safety benefit however having a significant cost to other street uses. We recommend that this design be reviewed periodically in the future, as usage of the cycleway grows .*	
Safety Engineer: *Agree that the pinch [point needs to be managed. Ideally wider and consistent cycle lane widths would be provided. If this cannot be done the conflict should be managed to mitigate the risk of a crash occurring and the risk of injury. This could for example making users aware of the paths tow way use, and moderating the speed of users on the cycleway – noting it could be used by electric powered / assisted vehicles.*	
Client Decision:*The trees are unde regular maintenance to ensure clear visibility for cyclists in both directions. Advance warning has been installed for cyclists. The trees are protected and cannot be removed.*	
Action Taken: *No action taken*	

4.4.7 Non-frangible hazards **Minor**

The wooden and concrete planter boxes installed on the central medians are solid objects that could be hit by an errant vehicle. The purple bollards installed at the pick-up/drop-off area in front of the skate park are also non-frangible and, therefore, a hazard for vehicles.

The probability of a loss of control crash is assessed as very unlikely due to low vehicle speeds. Good forward visibility is also typically provided. Also due to the low operating speeds, a minor injury crash would potentially result.

Table 4-10: Risk analysis – Vehicle against non-frangible hazard

Prominent crash type		▪ Vehicle against non-frangible hazard
Probability	Very Unlikely	▪ Low vehicle speeds; ▪ Good forward visibility;
Severity	Minor	▪ Low impact speeds of less than 30 km/h

Figure 4.4-25 – Planter boxes and purple bollards adjacent to traffic lanes

Recommendation:

1. *Consider removing non-frangible hazards or replacing them with frangible elements;*
2. *Consider reflective elements on the purple bollards.*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **Very Unlikely**	***Crashes are likely to be*** **Minor**
Design Team Response: *We agree with the recommendation that reflective elements, such as reflective tape, be installed on each bollard. In terms of their safety as non-frangible elements, these bollards were in a similar position prior to the trial, and the design team is not aware of any safety issues which arose from them at that time. They are designed to keep traffic out of the PUDO space, frequently used by children getting dropped off, and as such serve an important function in protecting those users in the event a car is not being driving in control. The low speed environment created by this project is seen to minimise the risk of a injury-crash caused by a collision with these bollards.*	
Safety Engineer: *Agree. Hazards should be avoided in the road environment as much as practical for all road users. Where they cannot be removed, they should be managed effectively, which would include suitable delineation.*	
Client Decision: *Bollards were pre-exisiting at a higher speed environment, the new design is a low speed environment.*	
Action Taken: *No action taken.*	

4.4.8 Detritus on the cycleway **Minor**

Gravel is tracking onto the cycle lanes on the southwest side of the Grey Street/Kahutia Street intersection. This could cause cyclists to lose stability and may result in a minor injury. The probability of this type of crash is assessed as very unlikely due to the fact that this issue has been identified at a localised point, with low to medium cycle volumes and low travelling speeds.

Table 4-11: Risk analysis – Cyclist loss of control

Prominent crash type		▪ Cyclist loss of control
Probability	Very Unlikely	▪ Localised issue; ▪ Low-moderate cycle volumes; ▪ Low travelling speeds.
Severity	Minor	▪ Low impact speeds of less than 30 km/h

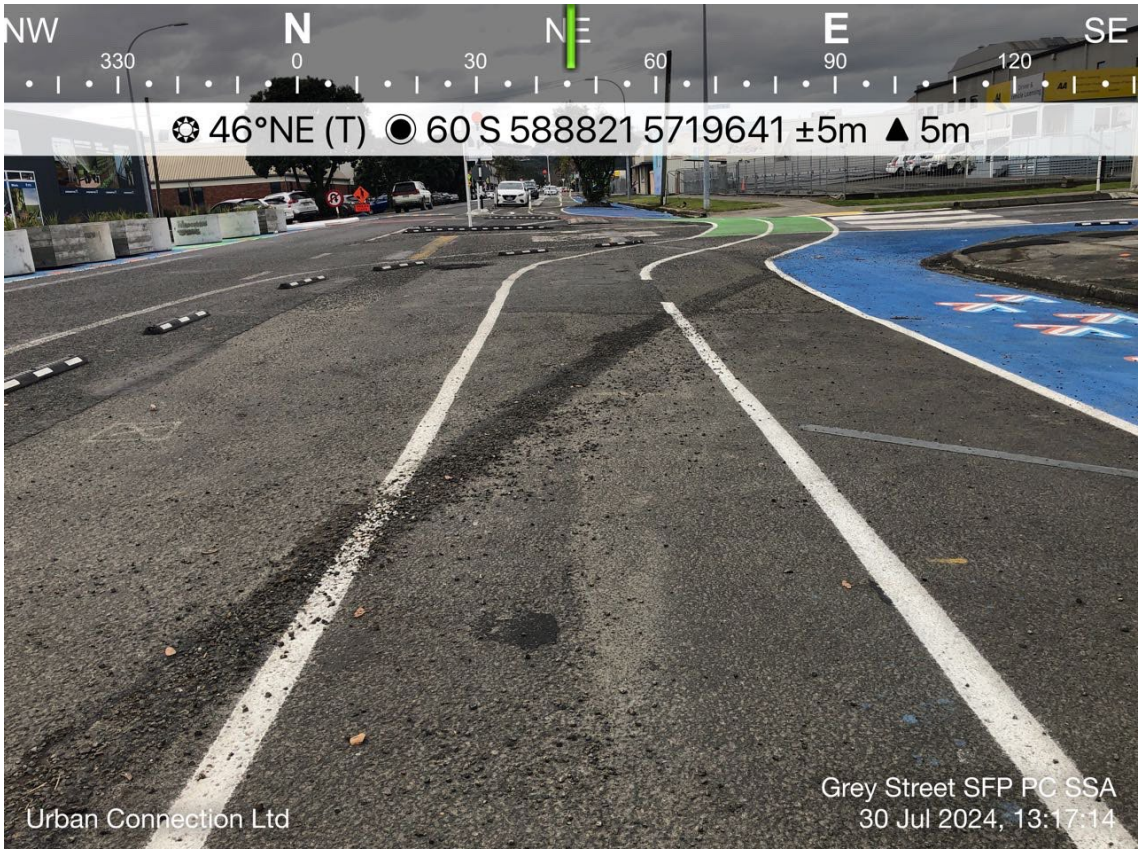

Figure 4.4-26 – Gravel/detritus on the cycle lanes

Recommendation:

1. *Sweep the pavement to provide a smooth riding surface.*

Probability Rating: ***The probability of a crash is* Very Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Minor**
Design Team Response: *It is recommended that GDC investigate this and consider street sweeping*	
Safety Engineer: *Agree. Foreign matter in the cycleways that could result in a loss of traction, or evasive manoeuvres should be avoided. It is expected that regular maintenance will be required on an ongoing basis.*	
Client Decision: *Cycleway has been added to a sweeping schedule under maintenance*	
Action Taken: *Will be swept regularly under the sweeping schedule.*	

4.4.9 Ponding **Minor**

There was one location (refer to photo) where stormwater was accumulated adjacent to the cycle lane. In wet conditions, it is likely that stormwater can encroach on the cycle lanes since it appears that the superficial drainage system is not appropriately capturing stormwater at this location. This could cause a cyclist to lose control due to slippery surface conditions and may result in a minor injury. The probability of a cycle crash is assessed as very unlikely since it appears to be a localised issue with low to medium cycle volumes and low travelling speeds.

Note that this condition is also likely contributing to pavement damage, as seen in the figure below.

Table 4-12: Risk analysis – Cyclist loss of control

Prominent crash type		▪ Cyclist loss of control
Probability	Very Unlikely	▪ Localised issue; ▪ Low-moderate cycle volumes; ▪ Low travelling speeds.
Severity	Minor	▪ Low impact speeds of less than 30 km/h

Figure 4.4-27 – Ponding adjacent to the cycle lane

Recommendation:

1. *Consider options to ensure water is adequately drained away.*

Probability Rating: ***The probability of a crash is* Very Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Minor**
Design Team Response: *Permanent changes to the street such as what would be required to remediate this are considered outside of the scope of this trial project. From the image, it appears that the ponding is near the maximum depth that the surrounding pavement undulations could support. It appears to be shallow, and generally outside of the cycleway- we agree it is a minor hazard.*	
Safety Engineer: *Drainage should be provided so as to avoid compromising safety. This could be by loss of traction, evasive manoeuvres, or aggregation of slippery material (mud or leaves for example).*	
Client Decision: *This is a pre-existing issue that would need to be reviewed if the project was to become permanent. All driveways are to be constructed as per the GDC engineering code.*	
Action Taken: *No action taken.*	

4.4.10 Manhole Cover **Minor**

There is a large manhole cover located within the cycle lanes adjacent to the new raised zebra crossing on Childers Road. In wet conditions, this manhole lid will likely be slippery, and a cyclist could lose control when travelling across it, especially given this is within the turn manoeuvre. Given the low to medium cycle volumes and low turning speeds, the probability is assessed as very unlikely. A minor injury would be expected also due to low travelling speeds.

Table 4-13: Risk analysis – Cyclist loss of control

Prominent crash type		▪ Cyclist loss of control
Probability	Very Unlikely	▪ Low-moderate cycle volumes; ▪ Low travelling speeds.
Severity	Minor	▪ Low impact speeds of less than 30 km/h

Figure 4.4-28 – Manhole cover on the cycleway

Recommendation:

1. *Consider installing a non-slip surface to the manhole lid.*

Probability Rating: ***The probability of a crash is* Very Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Minor**
Design Team Response: *We agree this is a hazard, given it's a location where changes in speed and direction are likely. Its recommended that GDC install a non-slip surfacing over this cover*	
Safety Engineer: *Agree. The manhole cover could be slippery when wet, especially if it has polished with use. Adequate traction should be provided for safe use. The cover should also be designed to avoid the retention of water and / slippery material (such as mud).*	
Client Decision: *Discussed with utility provider and this is unable to be moved. This is very unlikely and minor in terms of risk.*	
Action Taken: *No action taken.*	

4.4.11 Road Markings **Minor**

During the site visit, the auditors observed the following deficiencies associated with road markings:

- The zebra crossing advance warning diamond on the southbound approach to the raised crossing is missing. This is an important marking to ensure drivers are aware of the crossing ahead and can stop/give way in time;
- The hump markings (white painted triangles) on the existing raised crossing ramps have disappeared on both approaches. Hump markings are also missing at the new crossing on Childers Road. These are important delineation devices to assist drivers with knowing there is a raised crossing ahead;
- A number of existing carriageway markings are faded, such as:
    - the centreline and some edge lines on Grey Street south of Kahutia Street;
    - at the zebra pedestrian crossing north on Grey Street;
    - intersection limit lines at the Grey Street/Kahutia Street intersection.

The prominent crash types linked to the above deficiencies are side-impact and/or head-on crashes as a result of the missing limit lines and centrelines. Speed humps and lighting are provided in the vicinity of the pedestrian crossings, expected to generally prevent issues from arising. The probability is assessed as very unlikely due to the low operating speeds and good forward visibility. Crashes would be expected to be minor.

Table 4-14: Risk analysis – Side-impact/head-on

Prominent crash type		▪ Side-impact/head-on
Probability	Very Unlikely	▪ Low vehicle speeds; ▪ Good forward visibility;
Severity	Minor	▪ Low impact speeds of less than 30 km/h

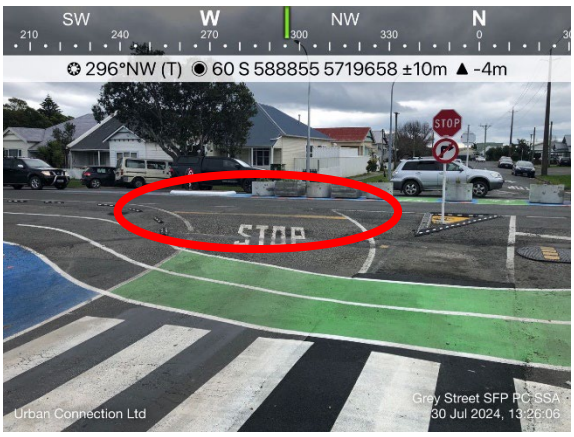

Figure 4.4-29 – Faded limit line at the Grey Street/Kahutia Street intersection

Figure 4.4-30 – Faded zebra markings on Grey Street

Figure 4.4-31 – Faded centre lines on Grey Street in front of the skate park

Figure 4.4-32 – Missing white triangles at raised pedestrian crossing

Recommendation:

1. *Install conspicuous road markings throughout the section in accordance with current standards/guidelines.*

Probability Rating: ***The probability of a crash is* Very Unlikely**	***Severity Outcome Rating:*** ***Crashes are likely to be* Minor**
Design Team Response: *Its recommended that GDC investigate the rapid fading of markings remediate.*	
Safety Engineer: *Regulatory markings must be provided. All necessary markings should be maintained to be effective and safe. The environment should be self explaining as much as practical. There may be a case to remove unnecessary markings; to avoid clutter and reduce the amount of paint on the road which can be slippery when wet (especially for two wheeled vehicles).*	
Client Decision: *The line marking has been added into the regular maintenance schedule. This was installed during winter and line marking has since been redone. Condition of the pavement impacts the durability of the line marking, however the pavement is outside of the project scope.*	
Action Taken: *Line marking to be monitored.*	

4.4.12 Cycle connections **Minor**

No safe cycling connections are provided on Childers Road approaching the bidirectional cycleway (refer to Figure 4.4-33). No ramps/kerb letdowns exist for cyclists to enter the cycle lanes adjacent to the new raised zebra crossing. Note that a kerb buildout blocked an existing ramp.

This condition can result in conflicts between cyclists and vehicles at this point. The probability of a cycle crash is assessed as unlikely, given the low speeds of approaching vehicles and low to moderate volumes of cyclists. Due to the low speeds, a crash would be expected to be minor.

Table 4.4-15: Risk analysis – Against vulnerable road users

Prominent crash type		▪ Vehicle v cyclist
Probability	Unlikely	▪ Low vehicle approach speeds; ▪ Low to moderate cyclist volumes.
Severity	Minor	▪ Impact speeds unlikely to exceed 30 km/h

Figure 4.4-33 – Cycle connections on Childers Road

Recommendation:

1. *Provide safe cycle connections to the side roads.*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **Unlikely**	***Crashes are likely to be*** **Minor**

Design Team Response: *Cycling improvements for travelling along Childers road are generally considered outside of scope of this project. Its important to note that prior to this project, the cycle lane shown ended in the same position as it does now, and cyclists were similarly expected to merge with general traffic through the roundabout. This project has improved conditions for those users, by installing a raised table so that the shared lane has a lower operating speed, as well as through providing priority for cycle users crossing Childers road here. In the interests of their own safety, its recognised that many cyclists may have previously chosen to mount the footpath, using the former pram crossing, rather than merge with traffic. This option would not interact safely with the new zebra crossing nor new lighting. Those users could instead mount the Childers Road footpath 35m prior to this position, at the nearest vehicle crossing. Its recommended that any future project on Childers Road consider separated infrastructure for cyclists on approaches and through this intersection. In the mean-time, as a low-cost interim measure, we suggest a sharrow marking be considered in the centre of the general lane on Childers Road on the final approach to the raised table be considered, to indicate to all road users that cyclists may be merging with general traffic here.*

Safety Engineer: *Agree. Effect and safe cycle connections should be provided. These should provide suitable surface traction and avoid hazards for example.*

Client Decision: *Recommendation to be investigated however the probability is unlikely and severity is minor.*

Action Taken: *To investigate*

4.4.13 Visibility at Childers Road crossing **Minor**

GDC has informed the auditors about a near-miss conflict between a pedestrian and a mobility scooter user at the footpath on the southern quadrant of the Grey Street/Childers Road roundabout. The near-miss conflict is likely to have arisen due to the limited forward visibility, obstructed by a wall, at the intersection's corner (refer to Figure 4.4-34).

This condition can result in conflicts between vulnerable road users (pedestrians, cyclists and other wheeled users) at this point. This area is likely to experience a relatively high demand of cyclists and, particularly, pedestrians. However, the probability of a conflict is assessed as unlikely, given the relatively low walking/riding speeds. Similarly, a conflict would likely result in a minor injury due to the low speeds.

Table 4-16: Risk analysis – Vulnerable road users conflict

Prominent crash type		▪ Vulnerable road users conflict.
Probability	Unlikely	▪ Low walking/riding speeds.
Severity	Minor	▪ Low impact speeds of less than 30 km/h

Figure 4.4-34 – Visibility at the corner (Source: GDC)

Recommendation:

1. *Consider the following:*
    a. *Engage with the property's manager/owner to try and remove or reduce the height of the visibility obstruction (i.e., wall);*
    b. *Consider investigating the demand of vulnerable road users at this point to understand the suitability of the current treatment and, for instance, whether a slow zone shared path treatment would be appropriate;*
    c. *Consider other opportunities, such as a convex mirror, to improve the visibility at the corner.*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **Unlikely**	***Crashes are likely to be*** **Minor**
Design Team Response: *We agree that GDC should consider engaging with the property owner as recommended to determine whether changes can be made to the wall. We disagree with the suggestion of a shared path at this corner. Shared paths provide poor outcomes for all users, particuarly less-able pedestrians. Further, its important to keep wheeled users, who are often moving faster than footpath users, as far from the obstruction as possible, to maximise sightlines between these users and all other users. Separation should be made as clear and legible as possible to encourage users to stay in their space, an outcome which we recognise is Somewhat compromised here, due to project scope and budget. We believe that speed is managed as much as practicable at this location, through horizontal deflection, narrowing, and vertical deflection in the form of the ramp just to the south-west of the intersection on the cycleway. We agree that a convex mirror be investigated as a good improvement, however a limitation in many areas is that these can be commonly vandalised.*	
Safety Engineer: *Agree that the conflicts need to be managed safely. Ideally the sight lines should be improved and / or balanced in keeping the space available and speeds. A mirror is less effective and has limitations, thus should only be used as a temporary measure and / or if the safety risks cannot be otherwise addressed.*	
Client Decision: *This was an RFS we received and this will continue to be monitored through the 12 month trial.*	
Action Taken: *Continue to monitor*	

4.4.14 Posted Speed Limit **Comment**

The posted speed limit through the section is not clear. At the northeastern approach of the Grey Street/Childers Road intersection, a 30 km/h speed limit is set for traffic travelling towards the CBD, with no speed shown (covered with black tapes) for traffic travelling towards the site (i.e., southwest-bound).

At the southwestern approach, no speed signs are provided other than an advisory action zone sign with a very small 30 km/h roundel (refer to Figure 4.4-35). The sign is also mounted with two more signs (a speed hump and supplementary advisory speed signs), which reduces the likelihood of approaching motorists being able to comprehend the information (i.e., too much information is provided). This condition also does not comply with the rules of the Traffic Control Devices (TCD) 2004[3]. This is further discussed in Section 4.4.3.

Figure 4.4-35 – Action zone sign with 30 km/h advisory speed

The operating speeds throughout the section are considered typically controlled by the installed speed management measures. Therefore, this is presented as a comment. However, a clear posted speed of 30 km/h would be expected to further manage vehicle speeds, resulting in safety benefits throughout the section where a high presence of vulnerable road users is anticipated.

[3] Land Transport Rule – Traffic Control Devices 2004 – Rule 54002/2004 – Section 4.5

Recommendation:

1. *Consider extending the existing posted speed limit of 30 km/h on Grey Street to the southwest (through the site);*
2. *Install traffic signs in accordance with TCD rules.*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **N/A**	***Crashes are likely to be*** **N/A**
Design Team Response: *This sign pre-exits the project, and is considered outside of our scope. We agree with the recommendation to extend/formalise a 30km/h speed given the uses on and around this street, and add that it would be consistant with the design speed this project has created on this street.*	
Safety Engineer: *The environment should suitably control and promote moderate speeds as suggested is the case. Ideally the speed limit would be consistent with planned management of the area. Any change in speed limit will need to be cognisant of the speed limit legislation that is under review. The action zone sign lettering appears too small to be read by motorists and is a non-standard shape. Signs appropriately designed to provide a clear and concise information to the target audience should be provided. Compliance with the TCD Manual should achieve this.*	
Client Decision: *Pre-existing advisory sign, the speed limit is to be reviewed under the speed limit review programme. Current speed limit is 50km/h.*	
Action Taken: *No action taken.*	

4.4.15 Pavement Conditions **Comment**

There were a few locations throughout the site where pavement defects have been identified. The pavement defects typically consist of cracking and potholes. These pavement defects are currently assessed as a nuisance; hence, this section is presented as a comment. However, prompt action is considered required so that the pavement defects don't expand and adversely affect safety within the site.

Figure 4.4-36 – Pavement defects

Figure 4.4-37 – Pavement defects

Figure 4.4-38 – Pavement defects

Figure 4.4-39 – Pavement defects

Recommendation:

1. *Identify and promptly repair the pavement defects within the site;*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **N/A**	***Crashes are likely to be*** **N/A**
Design Team Response: *Permanent pavement remediations are considered generally outside of the scope of this trial project, however we suggest that GDC consider this recommendation*	
Safety Engineer: *Agree. The pavement should be managed to avoid safety issues; loss of traction, loss of stability, or with users attempting to avoid / evade defects.*	
Client Decision: *Outside of the project scope.*	
Action Taken: *Pavement will remain as is until further action is required and or considered for renewal*	

4.4.16 Green Surfacing Markings **Comment**

While most of the driveways that cross through the bidirectional cycleway have green surfacing markings, some driveways do not have such provisions. Green surfacing markings are important delineation features that highlight the interaction with the cycleway and the potential presence of cyclists. A consistent treatment throughout the site is assessed to positively affect the safety of all users.

Figure 4.4-40 – No green surfacing through driveway

Figure 4.4-41 – No green surfacing through driveway

Recommendation:

1. *Consider installing green surfacing through all driveways;*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **N/A**	***Crashes are likely to be*** **N/A**

Design Team Response: *Green surface markings were included for these locations in the original design, however it was decided to delay their implementation as there was potential for changes to the layout in this area early in the trial. For safety and legibility, we agree that these markings should be added.*

Safety Engineer: *Green surfacing helps highlight the presence of cyclists, and should be installed as part of a wider safety and management regime. Additional facilities should be considered if there are locations / vehicle crossings where there is elevated risk of conflict.*

Client Decision: *Green line marking was not installed as part of an adaption to the design with the potentional of the carparks being moved towards the footpath.*

Action Taken: *Line marking remains uninstalled until further action is required*

4.4.17 Lighting **Comment**

During the nighttime inspection, it was observed that the newly installed low-level lighting poles were not working at the pedestrian crossings on Childers Road (raised crossing) and Grey Street (zebra crossing). However, overall, the site was assessed to have good lighting levels, with other existing lighting poles in the vicinity of the pedestrian crossings being lit.

It is understood that lighting installation was being finalised at the time of the audit. This is, therefore, presented as a comment at this stage. However, it is important to highlight that the low-level lighting poles must be functional to improve lighting levels in the vicinity of the pedestrian crossings.

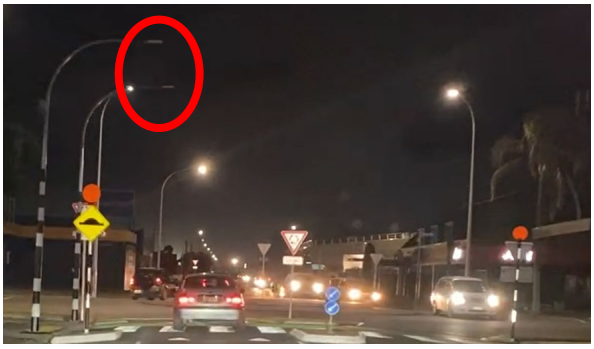

Figure 4.4-42 – Low-level light not working on Childers Road

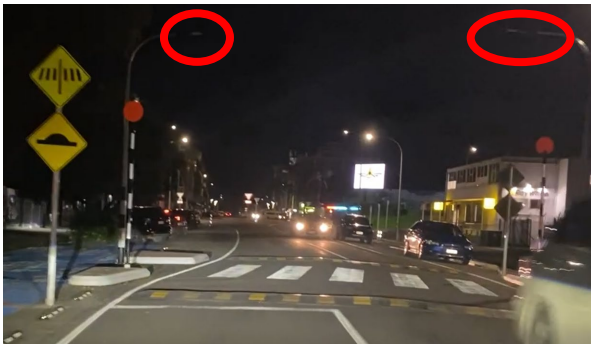

Figure 4.4-43 – Low-level light not working on Grey Street

Recommendation:

1. *Ensure that the low-level lighting poles are functional;*

Probability Rating:	***Severity Outcome Rating:***
The probability of a crash is **N/A**	***Crashes are likely to be*** **N/A**
Design Team Response: *This is for GDC to investigate.*	
Safety Engineer: *Agree that lighting should be installed and operating as intended, especially for pedestrian safety.*	
Client Decision: *Eastland Network were still processing the application to turn the new lights on during the safety audit.*	
Action Taken: *The lights are now active*	

5 Safe System Audit Statement

We certify that we have used the available plans and have examined the specified roads and their environment to identify features of the project we have been asked to look at that could be changed, removed, or modified in order to improve safety. The problems identified have been noted in this report.

Signed: (Signed on pdf) Date: 28 August 2024

Matheus Boaretto, BEng (Civil), GradDipEng (Highways)
Senior Transport Engineer, Urban Connection Limited

Signed: (Signed on pdf) Date: 28 August 2024

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Principal Safety Engineer, Urban Connection Limited

Designer:	*Name: .....Sam Hood .....*	*Position: Transport Engineer*
	Signature……	*Date 20/09/2024*
Safety Engineer:	*Name: .....Glenn Connelly.....*	*Position: Senior Sagety Engineer*
	Signature……..	*Date 16/09/2024*
Project Manager: *Manager…*	*Name: .....Lauriel Edwards…*	*Position: Urban Area Network*
	Signature……	*Date 11/09/2024*
Action Completed:	*Name: .....Dave Hadfield…….*	*Position: Journeys Infrastructure*
Manager	*Signature……..*	*Date: 11/10/2024*

Project Manager to distribute audit report incorporating decision to the designer, Safety Audit Team Leader, Safety Engineer, and project file.

Date: ……

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Grey Street SFP Post-Construction SSA_Rev0

Document Status FINAL

Revision	Prepared by:	Reviewed by:		Approved by:		
		Name	Signature	Name	Signature	Date
0	Matheus Boaretto	Aaron Campion	(Signed on pdf)	Aaron Campion	(Signed on pdf)	28/08/2024